

Field observations on Prince Ruspoli's Turaco *Tauraco ruspolii*

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Although the Musophagidae are among the most characteristic birds of tropical Africa, they have received very limited attention from ornithologists, and little information is presently available on their biology in the field.

The need for field observations is particularly pressing for those species whose survival is at risk. One of these is Prince Ruspoli's Turaco *Tauraco ruspolii*, an endemic of the southern Ethiopian Highlands with a very restricted range, probably not larger than 5000 km². The species is currently considered Endangered in the IUCN criteria (Collar *et al.* 1994), but owing to difficulty of access and security problems in the area, it has never been studied in detail.

In this paper I report some data on the biology of *T. ruspolii*, collected during an expedition to south Ethiopia in spring 1995 and discuss them in the light of present knowledge of the genus *Tauraco*.

Study area

Observations were carried out in the Ethiopian administrative provinces of Bale and Borana, within the presently known range of *T. ruspolii*. Elevation in the area ranged between 1200 and 2000 m.

Owing to elevation, temperatures in the study area are not high, with annual means between 18° and 21°C. Rain falls in two separate rainy seasons (in April and October), and annual rainfall averages 700 mm, with some variation in different areas owing to altitude and exposure to rain-carrying winds (Wolde-Mariam 1969).

The main habitat is woodland dominated by *Acacia abyssinica*, *A. seyal*, *A. brevispica*, *Dichrostachys cinerea* and *Terminalia brownii*; figs (*Ficus sycomorus*, *F. thonningi*, *F. vasta*) are also common.

Northwards, woodlands grade into a much wetter forest habitat, where the dominant tree is *Podocarpus gracilior*. These forests are the northern limit of distribution of *T. ruspolii*, which is usually replaced inside them by the related species *T. leucotis* (Borghesio, in press).

Near the villages of Neghelli (5°20'N, 39°35'E) and Arero (4°45'N, 38°49'E) a different vegetation occurs, dominated by *Juniperus procera*; and in Arero, junipers form a true forest habitat, which, however, only extends over a small area (probably no more than 25 km²); elsewhere they grow sparser and are mixed with species coming from the adjoining woodlands.

Methods

Observations were carried out between 23 March and 6 June 1995, during daytime, from 6:30 to 18:30. Data were recorded opportunistically after making sure that the birds had not been disturbed or influenced in the execution of their behaviour. Three main activities were observed:

- feeding: individuals observed pecking or swallowing a food item;

- resting: individuals perching in a fixed position for at least two minutes, even if engaged in preening or other comfort activities;
- calling: individuals vocalizing from a fixed position.

Birds could be alone or in groups. A group was formed by individuals observed on the same tree or on nearby trees, but moving in the same direction in a co-ordinated way or performing the same activity.

The day was divided into six 2-h periods and the distribution of the observations and of activities was checked with χ^2 tests against the null hypothesis that they did not vary over the day, assuming that the number of hours of fieldwork in each period represented the expected distribution of the data. When data were not enough to permit statistical analysis, adjacent periods were merged.

Plant species were determined using Hedberg & Edwards 1989, Noad & Birnie 1989 and Bekele-Tesemma *et al.* 1993.

Results

Vocalizations

Four different vocalizations were recorded. These were:

1. the “main” call (= song), with probable territorial function;
2. a soft contact call uttered by birds on the move;
3. a growling call, with probable long-distance contact function;
4. a stress call.

The main call clearly resembles that of other *Tauraco* species (Dowsett-Lemaire & Dowsett 1988, Fry *et al.* 1988) in its general features. It is composed of an introductory clucking note, lasting about one second, and followed by a sequence of about ten low-pitched *kuk* sounds uttered at a speed of 2–3 s⁻¹. The song of *T. leucotis*, although similar, is easily distinguished in the field as it is clearly louder and more croaking in its intonation.

The song of *T. ruspolii* is not frequent, and it was heard on only eleven occasions during the survey. Singing birds were usually hidden inside the foliage of trees and difficult to locate. As is common in the Musophagidae (Candy 1984, Fry *et al.* 1988, Decoux & Erard 1992), the call of one bird often stimulated the answer of up to two others near by. On one occasion, at Wadera (5°45N, 39°20E), in a *Podocarpus* forest where *T. leucotis* was much more abundant than *T. ruspolii*, the song of the first species triggered that of the second.

Two different calls had a probable contact function. The first was a soft *crrr*, about one second in duration, probably corresponding to the soft *chirrr-cha* reported by Benson (1945). This was regularly uttered while moving among the branches, and probably permitted individuals in a couple or a group to keep close to each other; this call, although audible only at short distances, often allowed the detection of birds that would have otherwise gone unnoticed.

The second contact call was a coarse, loud growl, 1–2 s in duration, usually repeated several times for up to 30 s and in a chorus with other individuals responding from nearby. Birds engaged in these vocalizations were usually sitting in hidden positions among tree foliage. The probable contact function is suggested by the short duration of these choruses, in which all the birds called simultaneously, while responses determined by the “main” call were spread over some minutes. Apparently, there was some variation in these growling calls in different parts of the range of *T. ruspolii*: At Wadera, they were indistinguishable from the calls uttered by *T. leucotis*, and on at least two occasions, in the *Podocarpus* forest north of the village, individuals of the two species participated in the same chorus. At Arero, where *T. leucotis* was not present, the calls were shorter in duration and less coarse in timbre.

The last vocalization was a sudden shriek, of very short duration, given as a sign of fear, usually when a person unexpectedly appeared near a bird.

Diet

T. ruspolii seems to feed largely or perhaps completely on fruit. Various other species of turacos have been reported to rely partly on animal food (insects), especially while raising young (Jarvis & Currie 1978, Fry *et al.* 1988), but *T. ruspolii* was never observed to do so, although this possibility is not ruled out, since breeding individuals were not observed during the survey.

Table 1. *Food plants of Tauraco ruspolii*

Species	Family	Fruit diam (cm)	Fruit colour	Habitat
<i>Podocarpus gracilior</i>	Podocarpaceae	2.0	green	<i>Podocarpus</i> forest, forest margins
<i>Juniperus procera</i>	Cupressaceae	0.5	green	<i>Juniperus</i> forest
<i>Ficus sycomorus</i>	Moraceae	2.0	brownish	woodland
<i>Ficus vasta</i>	Moraceae	1.5	green/yellow	<i>Juniperus</i> forest, woodland
<i>Ficus thonningi</i>	Moraceae	0.8	green	<i>Juniperus</i> and <i>Podocarpus</i> forests, forest margin, woodland
<i>Vepris dainelli</i>	Rutaceae	2.0	orange	<i>Podocarpus</i> forest, forest margin
<i>Teclea</i> sp. (prob. <i>simplicifolia</i>)	Rutaceae	0.5	green	woodland
<i>Syzygium guineense</i>	Myrtaceae	1.0	purple	riverbanks
<i>Cordia africana</i>	Boraginaceae	1.0	yellowish	cultivated at Arero
<i>Acokanthera schimperi</i>	Apocynaceae	1.5	yellowish	<i>Juniperus</i> forest, forest margin

Table 1 lists ten plants on which *T. ruspolii* was observed to feed, with the habitats where they were found and information on the size and colour of the fruit. Fruits varied widely both in colour and in diameter; it is remarkable that many of them were green, thus confirming that this colour is by no means avoided by turacos (Dowsett-Lemaire 1988). Fruits were always swallowed whole, and this possibly sets the upper limit of their diameter.

Figs (*Ficus* spp.) and the two conifer species (*Juniperus procera* and *Podocarpus gracilior*) probably represented the most important food plants (Fig. 1): these three species totalled 74 per cent of feeding observations ($n = 81$) and single individuals or groups up to eight were often observed to feed on these trees, sometimes spending the whole day in or close to them. Table 1 lists also *Acokanthera schimperi*, the "poison-arrow tree"; feeding by *T. persa corythaix* (the Knysna Lourie or Turaco) on the related *A. spectabilis* and by *T. hartlaubi* on *A. longiflora* has already been reported (Jubb 1965, Fry *et al.* 1988), and judged extraordinary, based on the supposed poisonousness of these fruits; however, the ripe fruits of *A. schimperi* are not poisonous, and are habitually eaten by humans (Bekele-Tesemma 1993), thus there is no reason to suspect that *T. ruspolii* possesses any particular ability to tolerate vegetal poisons.

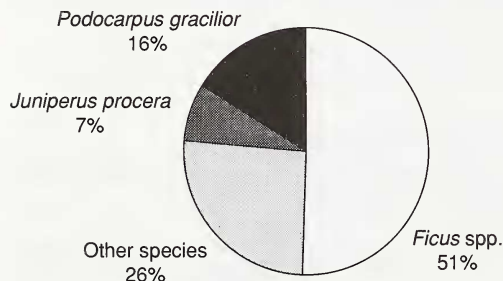


Figure 1. Food plants used by *Tauraco ruspolii* (percentage of overall feeding observations)

T. ruspolii is able to exploit new food sources, when they become available; this is suggested by the birds observed on 2 June 1995 feeding on a large *Cordia africana* growing in the vicinity of the village of Arero. This tree was cultivated and the species is not reported from elsewhere in the area (Haugen 1992), although it grows in the forests situated about 100 km northwards, where *T. ruspolii* is still found.

The list of Table 1 is probably far from complete, since during the survey individuals of *T. ruspolii* were observed on various other unidentified trees and shrubs bearing fruits on which they were probably feeding.

General behaviour and daily activity rhythm

A total of 188 *T. ruspolii* were observed during this study; of these, 77 (41 per cent) were solitary and 111 (59 per cent) in groups of 2 to 8 individuals (mean 2.8 ± 1.4 ,

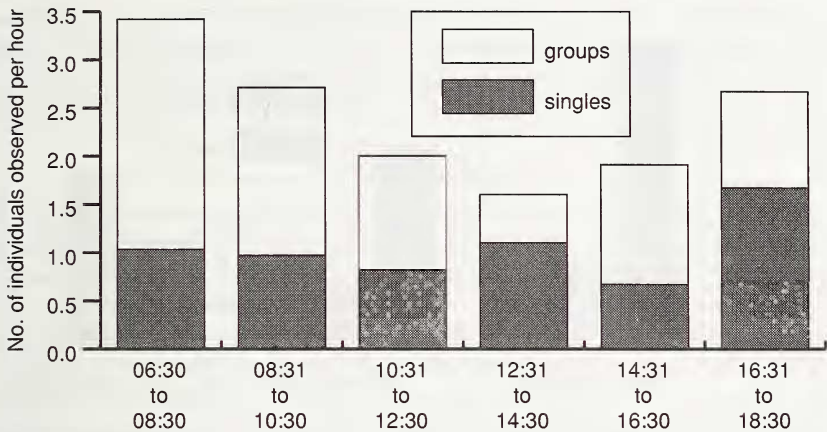


Figure 2. Numbers of *Tauraco ruspolii* observed during different 2-h periods

median 2). Figure 2 shows the variation of the mean number of individuals met with during the day, calculated as the number of individuals observed in each 2-h period divided by the number of hours of fieldwork in that period. The number of individuals observed varied significantly during the day ($\chi^2 = 11.4$, $n = 188$, d.f. = 5, $P = 0.047$) and there was a marked decrease in the middle hours: this was mainly related to groups, which showed highly significant changes, while observations of single individuals did not (for groups, $\chi^2 = 18.6$, $n = 111$, d.f. = 5, $P = 0.002$; for singles, $\chi^2 = 5.3$, $n = 77$, d.f. = 5, $P = 0.37$).

In the first part of the day, from 6:30 to 12:30, groups averaged 3.1 ± 1.6 individuals, while in the following hours, from 12:31 to 18:30, the mean group size dropped to 2.3 ± 0.5 ; this difference, however, was not significant (Mann-Whitney, $U = 118$, two-tailed, $P = 0.13$), since median and modal dimensions of the groups did not differ, being 2 in both cases. Changes in mean values were therefore related to regular observation of groups of 4 to 8 individuals at the beginning of the day, this causing a significantly larger range of variation in the size (and a consequently higher standard deviation) of the morning groups than in those of the rest of the day (Moses test of extreme reactions, $n_1 = 27$, $n_2 = 12$, $P = 0.001$). These large groups were probably associated with feeding activity.

Figure 3 shows the distribution of the three main activities within the day. Feeding had a strong peak in the morning and decreased in later hours ($\chi^2 = 10.8$, d.f. = 2, $n = 81$, $P = 0.004$); feeding individuals could be observed throughout the day, as reported for other species (Jarvis & Currie 1979, Fry *et al.* 1988), but most of the food was certainly taken in the morning, when the turacos often congregated on a single large fruiting tree, which was usually exploited for several days. Vocal activity was at its maximum at the end of the day, and reached a minimum around midday ($\chi^2 = 6.4$, d.f.

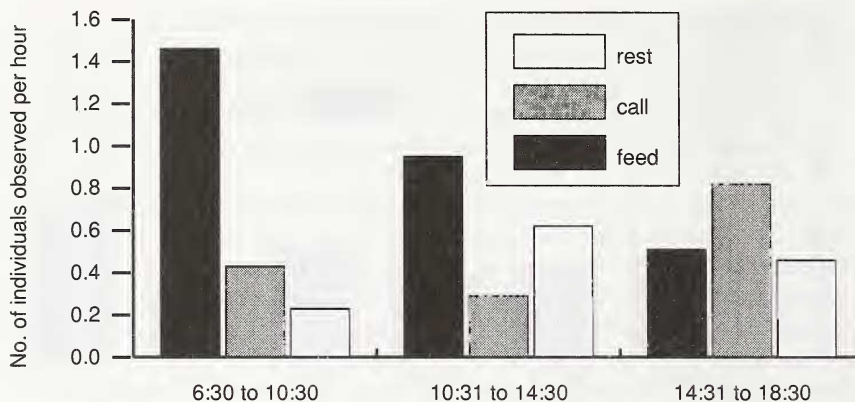


Figure 3. Diurnal activities of *Tauraco ruspolii* observed during different 4-h periods

= 2, $n = 37$, $P = 0.04$), while resting had a small peak (not statistically significant) in the middle hours ($\chi^2 = 5.2$, d.f. = 2, $n = 30$, $P = 0.07$); variations in resting activity were probably underestimated owing to the clearly lower detection rate of birds in the middle part of the day (cf. Fig 2).

Few other activities were observed during the survey and no statistical analysis was attempted on these, owing to the small size of the sample.

At Wadera, one *T. ruspolii* was observed on the same tree with a *T. leucotis* in a *Podocarpus* forest habitat; the two birds had raised crests and were possibly engaged in aggressive behaviour, but this could not be confirmed with certainty since they flew off immediately after they had been spotted.

On a few occasions, usually in the morning between 7:30 and 10:00, the birds engaged in sudden pursuits, with one individual running along branches or flying to nearby trees and another following it closely; this behaviour did not seem to be a form of aggression as it never resulted in physical contact between the individuals performing it; moreover, when the pursuit ended, the birds usually remained together in the same tree or on the same branch, showing no sign of stress. The meaning of this behaviour is not clear; I also observed it in *T. leucotis*.

Breeding

During the survey no nest of *T. ruspolii* was found. However, some information was obtained from local people, who usually knew the species quite well, and called it *wayuwaro* in the Borena language, a name used also for *T. leucotis*. At Sokora (5°37'N, 39°18'E) and Arero, where *T. leucotis* was not present, thus avoiding possible confusion, many local people agreed that the nest of *T. ruspolii* was "cup-shaped, similar to that of a pigeon" and contained "one or two whitish eggs". All the informers

said that this nest was very rarely found, because it was invariably well hidden in the trees. One other informer, on 22 May, claimed having observed an occupied nest of *T. ruspolii* about a week before, at a locality about 15 km north of Arero; I was not able to visit the place to confirm the record.

Local movements

In contrast to most other species in this family (Moreau 1958, Fry *et al.* 1988), *T. ruspolii* seems not to be a completely sedentary species, and some data suggest the existence of small-scale movements. This evidence derives mainly from repeated visits to the same localities.

At Sokora, during three visits (25 March, 14–15 and 22–23 April) numerous individuals were easily observed in the woodland surrounding a small river and up to about 4 km east and west of it. On a fourth, later visit, on 27–28 May, none was found away from the river; only five birds were seen, after a lengthy search, all of them feeding on a large *Ficus thonningi* growing a few metres from the water.

About 3 km east of Bobela (4°50'N, 38°52'E), in a woodland adjoining *Juniperus* forest, three *T. ruspolii* were recorded in a 2-km transect on 28 March. Two months later, on 1 June, the same locality was searched for one full morning, covering no less than 10 km, but no turaco was seen. On the other hand, inside the *Juniperus* forest, 2 km west of the village, *T. ruspolii* was observed on both visits. At Wadera, in an area of better rainfall than Bobela and Sokora, *T. ruspolii* was observed on many occasions between 22 March and 26 May, in the *Podocarpus* forest and in the transitional habitat where woodland and forest abutted.

The possibility that *T. ruspolii* is not completely sedentary was also confirmed by local informers in the area of the river Awata, west of Hare Kelo (5°33'N, 39°24'E), where the species was said to be very common during the dry period of the year, but becoming much rarer during the rains.

These observations suggest that *T. ruspolii* may regularly perform short-range movements, of probably no more than a few kilometres from the wetter habitats (forests, forest margins, riverine formations) where it appears to be recorded throughout the year, to the drier woodlands surrounding them.

Discussion

Most of the information on *T. ruspolii* in the present paper compares quite well with that available for the other *T.* species of the genus. However, some differences are notable.

Referring to vocal activity, *T. ruspolii* is a relatively silent species, while most other turacos are usually quite noisy (Fry *et al.* 1988). The difference is particularly striking in comparison with *T. leucotis*, which is probably its closest relative (Moreau 1958, Hall & Moreau 1962) and is sometimes sympatric with *T. ruspolii*. It must be recalled, however, that this study only covered a period of under three months, and that there is thus no certainty that *T. ruspolii* is a silent species during other times of the year.

The description of the nest and the eggs by local people is in good accordance with those available for other species of turacos (Courtenay-Latimer 1942, Fry *et al.* 1988, Fotso 1993). The possible nesting record for the end of May indicates that breeding could start at the end of the long rains. *T. leucotis* was breeding in the study area in the same period, since two nests of this species were found, one at Dawa (5°20N, 39°02E) and the other at Kibre Mengist (5°53N, 39°00E).

As for its feeding preferences, *T. ruspolii* obviously depends on the fruits that are most common and easily available in its range. Its diet, however, seems not to be restricted to a few food sources and it is likely that the species will prove able to feed on most kinds of fruits with soft pulp smaller than about 2.5 cm in diameter.

Some particulars of the behaviour of *T. ruspolii* seem to be related to its preferred habitats, that is, relatively dry forest margins and woodlands. Most (59 per cent) of the observations were of grouped individuals, and large groups were especially frequent in the morning, when most feeding took place: this could be a consequence of the food plants being rarer and more spaced from each other in the woodlands than in the forests, thus obliging birds from a relatively large area to gather on each food plant. On the other hand, individuals of *T. leucotis* that, in the study area, occupied wetter habitats than *T. ruspolii*, especially *Podocarpus* forests, where food sources are commoner, were mostly observed as solitary birds (Borghesio, unpubl. data).

The evidence, although not definitive, for the existence of local movements has never been reported for other turacos, and seems to be an adaptation to seasonal habitats where food availability is not constant. Other authors (Ash & Gullick 1989), having re-visited the same localities after some years, hypothesized that dramatic numerical decreases could have occurred. However, this could prove incorrect if the observations were carried out in different seasons of the year. The only way to correctly evaluate the population trend of *T. ruspolii* seems to be of repeating counts in the same localities and at exactly the same period of the year, in order to rule out the possibility of movements that could conceal population changes.

Acknowledgements

Many people gave their help and friendship during this work, both in Ethiopia and in Italy. They are listed here in alphabetical order: Dr John Ash, John Atkins, Ato Yilma Dellelegn, Prof Mauro Fasola, Ato Amare Kifle, Dr Yalemtehay Mekonnen, Ato Tilaye Nigussie, Ato Shemseddi Nuri, Giampiero Pagani, Prof. Anacleto Sabbadin, Per Ole Syvertsen, Ato Abebe Takwa, Don Turner, Ato Akale Yemane and Ato Melaku Zendu. The research was supported by a grant from the Bird Exploration Fund and received important assistance from the Ethiopian Natural History and Wildlife Society and the Istituto Italiano di Cultura in Addis Ababa.

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Scopus 19: 83–91, March 1997

Received 30 March 1996